AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraph beginning at page 1, line 7, as follows:

In mobile radio communications systems, the signal propagation between a transmitter and a receiver can be understood by introducing the concept of a mobile radio channel impulse response that introduces a filtering action on the signal. For example, the baseband impulse response, $h(t)$, can be expressed as:

$$h(t) = \sum_{i}^{N} \chi_i e^{j \cdot \phi_i} \delta(t - \tau_i) \qquad \underline{(1)}$$

where χ_i is the amplitude of the i[th] received signal, ϕ_i is the phase shift of the i[th] received signal, δ is the impulse function, and τ_i is the time delay of the i[th] received signal. Equation (1) shows that the received signal can be thought of as a series of time-delayed, phase-shifted, and attenuated versions of the transmitted signal. If the channel is time variant, then χ_i, ϕ_i, and τ_i are also functions of time.

Please amend the paragraph beginning at page 2, line 11, as follows:

A multi-path signal envelope is characterized by a distribution function of amplitude that follows the so-called Rayleigh distribution function, which is why multipath <u>is</u> sometimes referred to as Rayleigh fading. When a mobile radio moves in a multipath environment, the received signal appears to vanish, i.e., "fade," at certain positions. However,~~-~~ moving a few meters brings it back again. Thus, a mobile radio moving in a multipath environment experiences signal fluctuations, and this effect is referred to as Rayleigh or fast fading.

Please amend the paragraph beginning at page 2, line 18, as follows:

A multi-path signal envelope is characterized by a distribution function of amplitude that follows the so-called Rayleigh distribution function, which is why multipath <u>is</u> sometimes

referred to as Rayleigh fading. When a mobile radio moves in a multipath environment, the received signal appears to vanish, i.e., "fade," at certain positions. However, moving a few meters brings it back again. Thus, a mobile radio moving in a multipath environment experiences signal fluctuations, and this effect is referred to as Rayleigh or fast fading.

Fig. 1 illustrates a schematic diagram of a communications system 10 with a transmitter 12, transmitting information over a carrier frequency f_c on a radio channel that is subject to fading $a(t)$ and noise $n(t)$. The received signal is received on a frequency that is offset from the transmit carrier frequency. The time-varying, complex fading coefficient $a(t)$ models fast fading. In essence, the Doppler spread describes how fast the channel is changing, or equivalently the spreading of the received signal caused by Rayleigh fading. More formally,

$$\cancel{f = f_c \cdot v/c} \qquad \underline{f_d = f_c \cdot v/c} \qquad \cancel{(1)}\underline{(2)}$$

where f_d is the Doppler spread, f_c is the carrier frequency, v is the mobile velocity, and c is the speed of light.

Please amend the paragraph beginning at page 4, line 19, as follows:

~~The present invention achieves these~~ These and other benefits are achieved by estimating a Doppler spread associated with a Rayleigh or fast fading channel established between a transmitter and receiver, e.g., a base station and a mobile station. In particular, the Doppler spread is estimated through calculation of the autocorrelation function of a sequence of complex channel estimates determined from the known sequence in a received signal. More specifically, a sequence of complex channel estimates obtained from the known sequence in a first sampling interval is complex conjugated and then correlated with a sequence of complex channel estimates obtained from the known sequence in a second sampling interval which have been not been

complex conjugated. A zero crossing of the complex autocorrelation function is detected, and the estimated Doppler spread is calculated using this zero crossing and a Bessel function.

Please amend the paragraph beginning at page 13, line 11, as follows:

In any event, the known sequence (preferably frequency offset compensated) is provided to the Doppler spread estimator 80 which performs the Doppler spreading estimation as described above. The Doppler spread estimate is provided to the channel estimator 76 along with the known sequence used to estimate the channel. The channel estimator 76 may be, for example, a finite impulse response (FIR) transversal filter used to estimate the channel impulse response (see equation (1)) based on the known sequence. ~~In accordance with the present invention, that~~ That channel estimator takes into account the Doppler spread when formulating the channel estimate. Accordingly, when the unknown sequence is received, and preferably frequency offset compensated at mixer 86, it is combined with the channel estimate at mixer 88 to generate a phase-compensated sequence. In effect, the unknown sequence is filtered by the updated channel estimate. The phase compensated sequence is then forwarded to a demodulator to extract the transmitted data content. Depending on system performance requirements, the estimated variables may be used for different purposes in the demodulator. For example, a multi-path searcher in a W-CDMA system, used to find new multipaths, may use the estimations of Doppler spread and frequency offset to make path searching more efficient.

Please amend the paragraph beginning at page 13, line 18, as follows:

Fig. 12 ~~13~~ illustrates a Doppler spread procedure (block 100) in accordance with one example embodiment of the present invention. A transmitted signal having timeslots including known and unknown sequences is received over a Rayleigh fading channel (block 102). The received signal of the known sequence is sampled (block 104), and preferably compensated for

any frequency offset (block 106). Complex channel estimates are obtained from the known sequence in various time intervals/slots (block 108). An autocorrelation function is calculated using complex channel estimates and their complex conjugates, see equation (6) (block 110). From the determined autocorrelation function, a first zero crossing is detected, e.g., by interpolation (block 112). A Doppler spread associated with the Rayleigh fading channel is estimated using the lag value for the first autocorrelation function zero crossing and the zero order Bessel function of the first kind (block 114). The estimated Doppler spread is used to adjust the channel estimate, and perhaps to aid in other tasks like cell assignment, mobile radio location, etc. as discussed above (block 116).